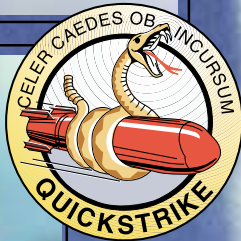


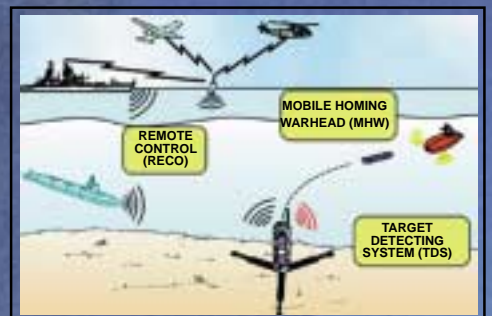
NAVAL SEA SYSTEMS COMMAND

MINING

NAVAL SURFACE WARFARE CENTER



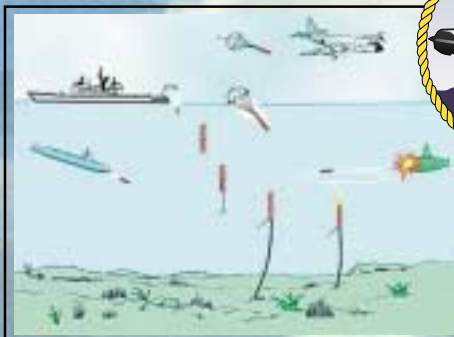
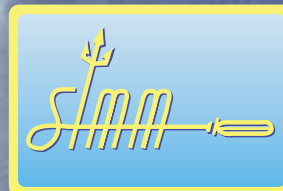
TDD MK71
For Quickstrike MOD 3



LITTORAL SEA MINE



VERSATILE EXERCISE MINES



IMPROVED SLMM



DAHLGREN DIVISION
DAHLGREN PANAMA CITY DAM NECK

Mines Division

The Coastal Systems Station (CSS) is the recognized U.S. Navy expert in mine development. The Mines Division formulates, develops, manages, and executes new developments and upgrades of underwater mine and mine systems, applying engineering disciplines in the areas of sensors and electronic elements used in target detection devices, mechanical structures, flight retardation, stabilization and control, and mine delivery systems. The division develops mine detection and control algorithms, operational data, minefield planning theory and analyses, limpet mines, and mine systems engineering—and supports mine technology development.

The division also performs life cycle support during the production, operational, and retirement phases of a weapon's life. Typical disciplines include: safety; Fleet operational support; engineering reliability and maintainability assurance; performance and maintenance data analysis; failure analysis and corrective action; technical documentation; integrated logistics support; configuration and data management; training and manning support; and demilitarization and declassification.

Major Programs and Products

QUICKSTRIKE

QUICKSTRIKE is a series of bottom mines that provide the U.S. Navy a mining capability against all targets found in shallow water regions. Three sizes of QUICKSTRIKE mines are available: 500- and 1000-pound mines, which are converted general purpose bombs, and a stand-alone 2000-pound mine, which is the Navy's largest conventional munition. The newest QUICKSTRIKE mines are programmable and modular, allowing them to be updated to keep abreast of emerging threat targets. Ongoing developments include new target detecting devices (TDDs) and target processing algorithms.

Target Detecting Device Development

TDDs control the actuation of explosives in underwater mines. Design expertise centers around the three major areas of TDD development:

- (1) Target influence sensors,
- (2) Sensor signal processing and target logic, and
- (3) Timing and control logic.

These major areas include those functions necessary to control the weapon—such as sensitivities, arming, and end-of-life functions. A representative sample of target influence sensor technologies currently under development includes:

- (1) Advanced signal processing techniques applied to sensor outputs to determine if a valid target is present, or if the detected influence signal(s) is (are) being generated by a countermeasure device; and
- (2) State-of-the-art, low power, high performance sensors used for detecting valid targets.

Algorithm Development

In an effort to maintain and improve the effectiveness of U.S. naval mines in response to changing world situations, new target algorithms for current and future TDDs are designed, developed, tested, and evaluated. The Total Mine Simulation System (TMSS) provides the development environment in which newly proposed algorithms can be tested and evaluated against prerecorded and simulated target and background data. TMSS also provides results that have been validated by in-water measurements and tests. The use of TMSS in developing mine firing algorithms has proved to be both time and cost effective.

SLMM (Submarine Launched Mobile Mine)

The MK67 SLMM is the only mine in the U.S. Navy stockpile that can be clandestinely delivered from long standoff ranges. It was developed from the MK37 Torpedo and is a bottom mine designed to attack surface and submerged targets in shallow water. An Improved SLMM program has been proposed to replace the MK67 by converting MK48 Torpedoes into dual warhead mobile mines. The Improved SLMM will be developed using the mine design expertise of CSS along with the propulsion expertise of the Naval Undersea Warfare Center, Division Newport.

CAPTOR (Encapsulated Torpedo)

The MK60 CAPTOR is the U.S. Navy's only deep-water mine. Delivered by aircraft, submarine, and surface ship, CAPTOR is a moored mine that carries a MK46 Torpedo as its payload and is designed to attack submerged targets. This weapon was developed by the Mine Division of the Naval Ordnance Laboratory, now located at CSS. A modification to CAPTOR is being considered as one of the options for the Littoral Sea Mine (LSM) program.

Mine MK56

Mine MK56 is a 2000-pound aircraft-laid medium depth moored mine. This mine has a magnetic firing mechanism that uses a total-field magnetometer to detect targets. When laid, the mine sinks to the bottom where case and anchor separate and the case rises to the preset mooring depth. This weapon was also developed by the Naval Ordnance Laboratory. The aging inventory of the Mine MK56 is to be replaced with the wide-area-coverage Littoral Sea Mine.

Mine Performance and Minefield Effectiveness

The Mine Performance and Minefield Effectiveness group generates operational data on U.S. naval mines against high-priority foreign vessels. The data is maintained in a database accessible to Fleet minefield planners and published in a nine-volume compendium of U.S. naval mine characteristics. Specifics of the effort include: the development of mission-abort damage contours, the acquisition of target signatures, and the generation of target damage for various mine algorithms. The division develops minefield planning theory as well as effectiveness and analysis techniques. Mine exercise data is analyzed and incorporated into current and future software tools. A mine effectiveness database is maintained and updated on a regular basis. Responsibilities include life-cycle maintenance and upgrades of the following software products:

- (1) The Forward Area Minefield Planning Module (FAMP)(a modular component of the Tactical Aircraft Mission Planning System (TAMPS)).
- (2) The Geo-Operational Planning and Assessment System (GOPAS),
- (3) Mine Master Record Sheet Application (MRSAPP), and
- (4) The CAPTOR Threat (CAPTHRT) Application.

As requirements and funding become available, new minefield planning models and tools are developed for the Fleet.

VEMS (Versatile Exercise Mine System)

VEMS is a portable, programmable, mine simulator training device. VEMS has the external appearance of a bottom mine, and can be programmed to emulate the target detection capabilities of various known bottom mines by emulating their mine-fire logic. In addition to emulating the logic, the VEMS collects data from its sensors and provides it to exercise participants in either real-time or as stored data for later analysis. By exercising against a device such as VEMS, mine hunting and sweeping forces can obtain a quantitative assessment of their effectiveness and vulnerability.



NSWCDD/MP-97/62: 10/99

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